

US Patent Application Serial No. 09/908,948
Amendment Dated 11/17/2005
Reply to Office Action Dated 8/17/2005

Remarks

Claims 1-23 are pending in the application and are presented for reconsideration without amendment. No new matter has been added.

Status of Claims

Claims 1-20 are allowed

Claims 21-23 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wu (U.S. Pat. No. 5,831,992) in view of Naffziger (U.S. Pat. No. 6,606,720).

The Examiner's rejections of the claims are respectfully traversed.

Response to Rejections of Claims Under 35 U.S.C. § 103

Applicant's claim 21 recites:

A method of testing an integrated circuit, comprising:
a) providing test data to at least two scan chains of the integrated circuit; and
b) shifting test data through the at least two scan chains in parallel, but out-of-phase, while at least a portion of the test data is being provided to the at least two scan chains.

The Wu Reference

The Examiner cites Wu as disclosing the use of two scan chains. The Examiner admits that the remaining limitations of Applicant's claims (e.g., out-of-phase operation of the two scan chains) are not taught by Wu.

The Examiner cites Naffziger as being in an analogous art and disclosing scan chain link transfer gates 422/424 and 426/428 that open and close out of phase (i.e., in an alternating manner). The Examiner refers to Naffziger, Figure 3 and 4, and col. 5, lines 8-29 in support of this assertion.

However, the Applicant notes that the scan chain link referred to in Naffziger, col. 5, lines 8-29 and in Figures 3 and 4, describe a *single* scan chain link (or cell). In a single scan chain link (e.g., 308 in Figure 4), transfer gates 422/424 and 426/428 open and close out of phase (i.e., in an alternating manner). Thus, data is shifted out of the corresponding latch during one phase

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of a shift cycle, while data is shifted into the corresponding latch during the second phase of the shift cycle. However, this operation does not mean that the data itself is out of phase *relative to data in another scan chain*, or even *relative to data in another link within the same scan chain*. First, Naffziger does not disclose anywhere the use of two or more scan chains, and therefore no conclusion can reasonably be made about the phase of data applied to multiple independent scan chains relative to one another. Second, even within the same scan chain, as shown in Naffziger's Figure 3, data is scanned out of all of the latches simultaneously under the control of the common SHIFT signal, and data is scanned into all of the latches simultaneously (albeit in a serial manner), also under the control of the common SHIFT signal. Thus, there is no relative phase difference between data shifting in and/or out between links of the scan chain.

Accordingly, Naffziger does not meet the limitation "shifting test data through the at least two scan chains in parallel, but out-of-phase" as required by Applicant's Claim 21.

Since neither Wu nor Naffziger meets the limitation "shifting test data through the at least two scan chains in parallel, but out-of-phase" as required by Applicant's Claim 21, Wu in combination with Naffziger does not meet the requirements of a 35 U.S.C. § 103(a) rejection. The Applicant therefore respectfully request that the Examiner withdraw the 35 U.S.C. § 103(a) rejection of Claim 21 and pass it to issue.

Claims 22 and 23 each depend from independent base claim 21 and add further limitations. For at least the same reasons that Claim 21 is not shown, taught, or disclosed by the cited references, Claims 22 and 23 are likewise not shown, taught, or disclosed. Thus, Applicant respectfully submits that the rejection of claims 22 and 23 should be withdrawn.

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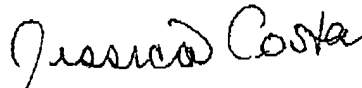
Conclusion

In view of the foregoing remarks, it is respectfully submitted that none of the references cited by the Examiner taken alone or in any combination shows, teaches, or discloses the claimed invention, and that Claims 1-23 are in condition for allowance. Reexamination and reconsideration are respectfully requested.

Should the Examiner have any questions regarding this amendment, or should the Examiner believe that it would further prosecution of this application, the Examiner is invited to call the undersigned.

Respectfully submitted,

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